

the tidal currents in bringing up the cold bottom waters of the ocean is perhaps a cause sufficient to produce most of the coldness of the water in this region.

ON *DINOCERAS MIRABILIS* (MARSH)

A SHORT time ago we gave a note respecting one of the recently-discovered gigantic fossil mammals from the Eocene of Wyoming in the region of the Rocky Mountains; the accompanying woodcut, copied from a paper by Prof. Marsh, on this extraordinary extinct animal, named by him *Dinoceras mirabilis*, will further assist in making its peculiarities easily understood.

The animal must have been nearly as large as the elephant, to which its limb-bones were very similar. The only teeth it possessed in the upper jaw, were a pair of well-developed canine tusks, and six pairs of small molars, whose crowns were formed of two transverse ridges, separated externally, but meeting at their inner extremi-

ties. The frontal region of the skull was concave, on account of the lateral projection-upwards of a bony ridge or crest on each side, which posteriorly developed into a large osseous process that may have been a horn core but perhaps was only covered with thick skin, and acted like the fibrous pads on the cheeks of the wart-hog, to shield the thinner skull from direct blows. Behind these the crest extended back beyond the level of the occipital condyles. The maxillaries each bore a conical process, which in a profile view is evidently seen to be directly above the root of the canine tusk, and supported it; it probably carried a horn. At the anterior extremities of the nasals were also two smaller horn cores. The horns must have been of a character very different from those in the rhinoceros, in which animal, however long they may be, they are only supported on a roughened surface of bone; if they resembled those of the cavicorn ungulata, from analogy we must suppose that they were small, for in those animals there is a close relation between the size of the core and that of the horn which it carried.

There were no postorbital processes to the frontal bones. The zygoma was completed in front by the malar, the lachrymal was large, and formed the anterior border

of the orbit; its foramen was exserted. The infraorbital foramen must have been behind the zygomatic ridge, as it does not appear in any of the drawings. The premaxillaries did not carry teeth; they sent forward two branches, which partially enclosed the sides of the external nares; the upper branch joined the nasal, and the lower, as in the Ruminants, continued free, and probably carried a pad. Prof. Marsh gives no illustration of the mandible, and only remarks of it that "the lower jaw was slender and the tusks small." The limbs were short, the fore limbs shorter than those behind. The radius did not cross the ulna so obliquely as in the elephant. In the head of the femur there was not any pit for the insertion of the round ligament. The great trochanter was flattened and recurved; the third trochanter was absent. The tail was short and slender. The ribs had rudimentary uncinat processes.

Prof. Marsh feels justified in placing *Dinoceras* in an order *Dinocerata*, distinct from the *Proboscidea*, on account of the absence of upper incisors; the presence of canines and horns; the absence of large cranial air cavities; the malar forming the anterior portion of the zygoma; the absence of a proboscis, which could not have been necessary in an animal that could easily touch the ground with its nose, and other less important differences.

This *Dinoceras* of Marsh is the *Eobasileus* of Cope and the *Uintatherium* of Leidy. The shortness of the published descriptions prevents us saying more about it at present.

THE TROGLODYTES OF THE VEZÈRE *

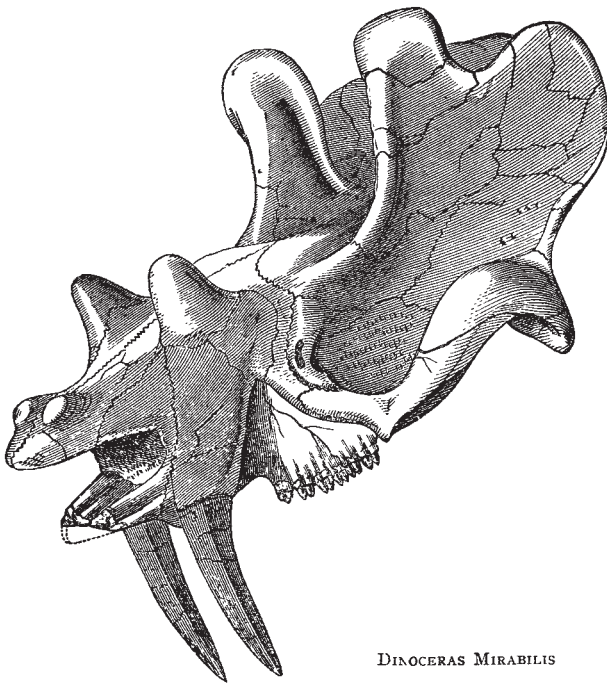
III.

Our Troglodytes of the latest epoch had, in fishing, another resource unknown to their predecessors. Their different stations contain a large number of fish bones; but it is remarkable that all these fish were salmon. Now the salmon in these days neither frequent the Vézère nor the part of Dordogne where that river joins the sea. At some leagues below the confluence, not far from Lalinde, in the centre of Dordogne, there is a bank of rocks, which, at high water, forms a rapid, and at low water a regular fall, called, The Leap of the Gratusse. The salmon do not pass this boundary, and, as it did not stop them at the epoch of the Troglodytes, we must conclude that, since that time, the level of the Dordogne has fallen, either by hollowing out its bed so as to lay bare the bank of rocks, or by losing part of its volume of water. We are led to believe that the fishermen of that time did not use nets, for with a net could be caught fish of all sizes. We thus understand why they could only catch large fish, and why they chose, among these, the kind they preferred. Had they any fishing boats? We have as yet found no proof of such. And besides, the Vézère is sufficiently enclosed for the large fish to swim along the banks within reach of the harpoons.

The harpoon of our Troglodytes was a small dart of deer-horn, very similar to the large barbed arrows, except that it was only barbed on one side. A little notch at the base enabled the fisherman to secure the cord which he held in his hand (see above, Fig. 10). The barbs are intended to secure the fish which it has struck. Why are these barbs all placed on the same side? Is it to diminish the width of the dart and make it more penetrating? This I cannot venture to affirm.†

* Continued from p. 325.

† One of my colleagues of the French Association, M. Lecoq de Boisbeaudrau, who did me the honour of being present at this lecture, communicated, the following day, to the Section of Anthropology, a very interesting note on the mode of action of the unilateral barbs of the harpoon. While the harpoon is traversing the air, these barbs cannot make it deviate sensibly; but directly it enters the water, the unequal resistance it meets there must necessarily change its direction. It seems, then, that the fisherman who aims straight ought the most frequently to miss his aim. But M. Lecoq de Boisbeaudrau reminds us of the well-known experiment of the straight



DINOCERAS MIRABILIS

ties. The frontal region of the skull was concave, on account of the lateral projection-upwards of a bony ridge or crest on each side, which posteriorly developed into a large osseous process that may have been a horn core but perhaps was only covered with thick skin, and acted like the fibrous pads on the cheeks of the wart-hog, to shield the thinner skull from direct blows. Behind these the crest extended back beyond the level of the occipital condyles. The maxillaries each bore a conical process, which in a profile view is evidently seen to be directly above the root of the canine tusk, and supported it; it probably carried a horn. At the anterior extremities of the nasals were also two smaller horn cores. The horns must have been of a character very different from those in the rhinoceros, in which animal, however long they may be, they are only supported on a roughened surface of bone; if they resembled those of the cavicorn ungulata, from analogy we must suppose that they were small, for in those animals there is a close relation between the size of the core and that of the horn which it carried.

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After fishing and hunting, they returned to the cave for their meals.

In the whole extent of the floor of the caves, at every level, the stratum which encloses broken bones contains likewise an enormous amount of particles of coal. This mixture is so universal, so uniform, that it is difficult to

believe that the Troglodytes only made fires for warming themselves. They must have lit their fires every day, and in all seasons; and hence it is more probable that they used them for cooking their food.

We do not know how they produced fire, whether they drew it from flint or from wood heated from friction.



FIG. 13.—Bone harpoon of the Terra del Fuegians.

Neither do we know how they cooked their food. They had no earthenware, and could not boil their meat on the fire. They did not roast it, for hardly a solitary calcined bone has been found, and then it has evidently been accidentally reduced to this state. Perhaps they boiled it in wooden vessels, in which water can be brought to the boiling point by putting into it pebbles made red hot in the fire. But it seems to me more probable that they cooked it under the ashes, as many uncivilised nations do to this day.

They enjoyed the brains of animals and the marrow in the long bones, for all the heads are broken, and all the medullary bones (to the exclusion of all others) are methodically divided. The marrow in bones is a dish relished by all savage nations. They break the long bone in a particular manner, and the chief sucks the marrow first. Our Troglodytes had little flint maces with cuneiform edge; these were a kind of hatchet for breaking the bones. There is, besides, another utensil in deer-horn, which was probably used for extracting the marrow (Fig. 14)

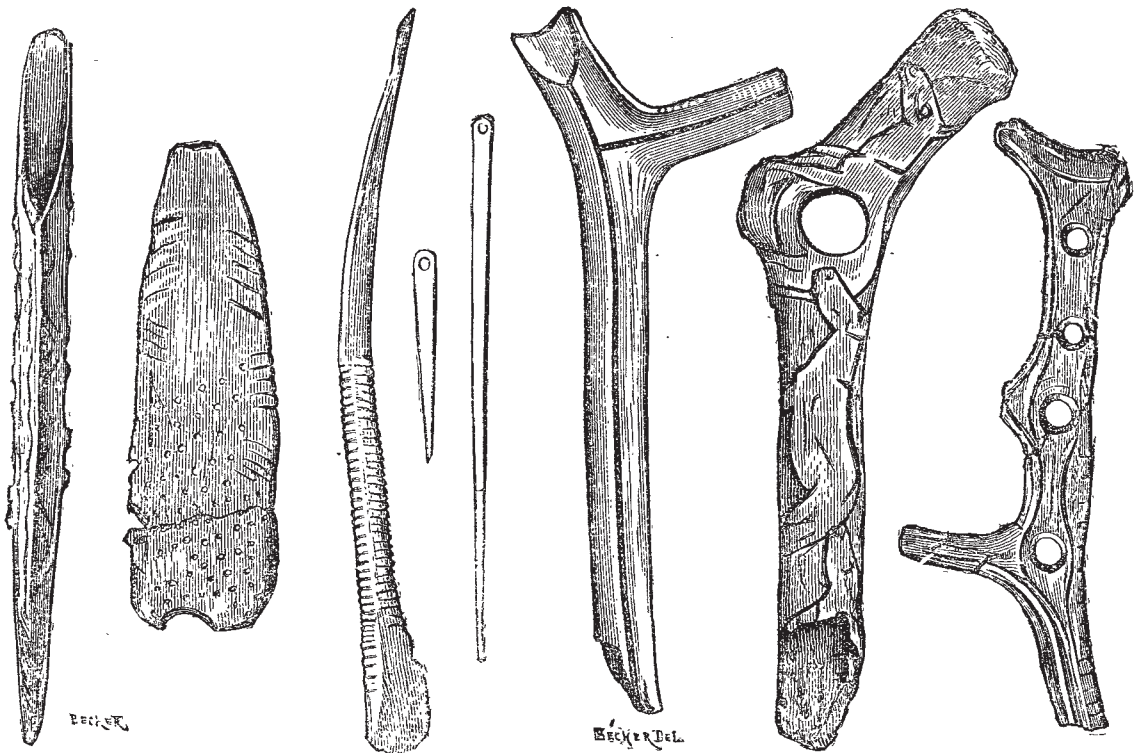


FIG. 14.—The marrow spoon. FIG. 18.—Needles. FIG. 17.—Hunting tablet. FIG. 13.—Account tablet. FIG. 19.—Baton of command with a single hole (reduced a third). FIG. 20.—Baton of command with four holes (reduced a third). FIG. 21.—The pogamagan of the Esquimaux (reduced a fourth).

The Troglodytes, after their meals, left the bones spread about the floors of their caves. In a warm climate, these remnants would have exhaled an insufferable odour, but

stick which appears broken when plunged obliquely in the water. In consequence of the refraction of the rays of light, the image of the fish is displaced, and in aiming straight at that image, one would miss one's aim. Here, then, are two causes of error. Now it is clear that, if they act inversely, they may compensate each other; and M. Lecoq de Boisbeaudrau demonstrates that when the unilateral barb is turned upwards, it brings back the harpoon towards the object. This arrangement in the harpoon would then be intended to rectify the aim, and this would credit our Troglodytes with a great power of observation. The inhabitants of Terra del Fuego still use a harpoon with unilateral barbs (see Fig. 13).

we must not forget that the temperature was then lower than it is now, and we must likewise confess that cleanliness was not the predominant feature of the men of those days.

Thanks to this uncleanly habit, the floor of their caves furnishes us with complete information as to their food. The flesh of the reindeer was their principal nourishment; they ate besides horses, aurochs, several kinds of oxen, chamois, wild goats, and even some carnivora; their predecessors did the same; but these had fish in addition, and the improvement in their bows and arrows enabled them to bring down game on the wing. Among

the remains of their repasts are found a variety of birds.

Among these innumerable *debris* of bones, there is not a single fragment of a human bone. Our good Troglodytes were, therefore, not anthropophagi. They must have fought occasionally to defend or enlarge their hunting territory; nevertheless, their equipment was more that of hunters than of warriors.

In reviewing their panoply, it is evident that the most dangerous weapons, those which could be available in a hand-to-hand fight, are the most rare, and we remain convinced that they were a pacific race.

It might be concluded that they wore no clothing, because all the men represented by their artists are completely naked; but that proves absolutely nothing. Do we not know that the Greeks often represented their gods and their heroes in a state of nudity?

In the Troglodyte caves have been found all the requisites for needlework. They had needles of bone and of deer-horn. Some were only piercers, like a shoemaker's awl, others were provided with an eye for holding the thread (see Figs. 15 and 16). There were some very fine ones. A small needle case has been found, made of a bird's bone, which could contain a number of them. They are supposed to have been obtained from the metacarpus of a horse, on which several longitudinal and parallel incisions, with a fine saw, have extracted little, narrow, even spiculæ of long bones. The work was not complete; but it is evident that these slender spiculæ could only be destined for making needles. The threads used in sewing were doubtless of different kinds. Did they use vegetable fibre or fine lashes of leather? It is possible and even probable. What is nearly certain is that our Troglodytes made threads or at least strings with the substance of tendons.

I do not know whether the Troglodytes utilised thus the nerves of the reindeer, but they carefully detached the long tendons with a certain little blow which produced on the surface of the bone a superficial abrasion of a very regular shape. This abrasion, always the same, has been found on different bones, but the spots where it exists have this in common, that they mark the place of a long tendon. It is, therefore, the proof of a methodical operation, which was doubtless practised before giving the meat to the cook, and which was probably destined to prepare threads for sewing.

Sewing is a proof of clothing, and not of that primitive clothing which consists of the skin of some animal thrown over the shoulders, but of a more complete dress, formed by the joining of several skins. The abundance of needles and piercers, and of scrapers which helped to prepare the skins, proves that the use of clothing must have been general. They also wore ornaments, which perhaps served as marks of distinction. These were necklaces or bracelets, formed of shells perforated and threaded.

Most savage nations have the habit of painting and tattooing themselves; we have no right to despise them on this account, for tattooing is still held in honour in the popular classes of the most civilised countries, and it is even hinted that ladies in the upper circles have not quite forgotten the art of pencilling. We must not then wonder at finding similar fashions among the Troglodytes. Their caves contain numerous fragments of the red stone which we call *red ochre*; the stripes frequently found on these fragments prove that they have been scraped. They therefore prepared a red colour, which was in constant use, and which probably served to ornament the body with pictures.

I have already said that Troglodytes were not nomads. Some individuals may doubtless have undertaken voyages, but the entire tribe never went far from their caves. It was then by means of barter or commerce that certain foreign articles were imported. The numerous perforated shells of which the necklaces and bracelets were composed,

were all foreign to the locality. Most of them belonged to the species *Littorina littorea*, and came from the shores of the Atlantic, where they are still very abundant. They were brought quite fresh, for they had their natural colours, which are preserved to this day in the floors of the caves. Other shells pierced in like manner with one hole, belong to five extinct species only to be found in *faluns*, and which date from the Miocene epoch. They are quite discoloured and broken into molecules; and the traces of rolling which they sometimes present, prove that they were fossils long before they were extracted from their tertiary beds to ornament man. Now the *faluns* which contain these five species are not found in the region of the Vézère. The nearest are those of Touraine, and it was from thence, in all probability, that our Troglodytes imported this toilet necessary. There have been likewise found in three stations, and principally at Upper Laugerie, little pieces of rock crystal; this substance must have come from the Pyrenees, the Alps, or



FIG. 22.—Combat of Reindeer.

the mountains of Auvergne. The foreign relations of the Troglodytes were therefore rather extensive.

Had they any religious faith? Nothing has been found in their habitations which could refer to any religious worship. But they wore talismans or amulets. These were a canine or incisive tooth of wolf, reindeer, ox, or horse. A hole, carefully bored at one extremity of the tooth, served for passing the string by which it was suspended.

At the same epoch, but in a different spot, certain funeral rites were observed. They placed the dead in a cave, whose narrow opening was closed by a flag-stone. In front of this stone was a little esplanade on which the afflicted relatives consoled themselves with feasting. This kind of consolation has been perpetuated from age to age, and it has not yet disappeared from among us.

At present we know of but one burying ground of the Troglodytes of the Vézère; it is that of Cromagnon. It is under a shelter and not in a cave; by the side of the corpses were placed carved flints and ornaments in shells, but there is no trace of a stone door.

The society of the Troglodytes was numerous, and hierarchically organised. There were several orders of dignitaries. The proofs of this organisation are to be found in the three stations of the last epoch—the Eyzies, Lower Laugerie, and the Madelaine. They are large pieces of deer-horn, carved artistically, and designated in general terms under the name of “batons of command.” These batons are numerous. Here are several, and you can see that they have a uniform type. Their whole surface is richly adorned with various drawings, representing animals or hunting scenes. They are less thick than wide, and the care that has been taken to diminish the thickness proves that they sought lightness rather than solidity. Then, again, the greater number, though not all, are pierced with large round holes, varying in number from one to four (see Figs. 19 and 20). The purpose of these very curious objects is still a disputed point, but most probably they were used as insignia. They indicate the sceptre, borne among the ancients, not only by the king, but by the chiefs of a less elevated rank. The dignity of marshal is to this day characterised by a baton. The batons of command are too numerous to allow of their being considered a sign of royalty. They are only signs of hierarchical distinction. The holes indicate the grade.

This superposition of grades or ranks, a sure sign of a numerous society, might doubtless be utilised in times of war, but it is very probable that it referred primarily to the appointment of hunting expeditions, for the chase was the essential element of public prosperity, and it was necessary to organise it systematically in order to secure food for the community.

Thanks to the organisation and administration of which we recognise the proofs, the society of Troglodytes, though numerous, lived in comfort. Food was sufficiently abundant to enable them to choose the best pieces, and reject those of an inferior quality. Thus, they despised the feet of animals, which nevertheless contain, in the bones and tendons, a remarkable quantity of alimentary matter. The destruction of dangerous animals had given security; the improvement in hunting had given abundance. It was no longer necessary for the entire tribe to devote their whole time, energy, and intelligence to the urgent necessities of daily life. They could rest occasionally. They could have leisure hours, and leisure, joined to intelligence, produces the arts.

(To be continued.)

NOTES

THE names of fifty-three candidates which, in pursuance of the Statute, were read out at the meeting on Thursday last, is a proof that the desire to enter the Royal Society does not abate. Out of this large number the Council will, in April, select fifteen whom they will recommend for election; and the names of these will, as usual, be made known at the meeting of the Society on the first Thursday in May. The selection ought not to be difficult, notwithstanding that in perusing the names we mark not a few instances of misplaced ambition, and indications that an obvious misunderstanding as to the qualification for membership exists on the part of the candidates. It must not be forgotten that the Royal Society is *not* a kind of superior College of Surgeons or Physicians or Preceptors; in fact, that something higher even than the art of healing or teaching must be looked for, namely, research, and the enlargement of the boundaries of knowledge. As in the majority of cases non-election is inevitable, it is as well that the number should be large: disappointment is, thereby, reduced to a minimum. But here is the list, and our readers may judge for themselves. The election day is fixed for June 12. W. Aitken, M.D.; Sir Alexander Armstrong, K.C.B., M.D.; R. Stawell Ball, LL.D.; Rev. A. Barry, D.D., D.C.L.;

E. Middleton Barry, R.A.; J. Beddoe, B.A., M.D.; I. Lowthian Bell; G. Bishop, F.R.A.S.; F. J. Bramwell, C.E.; W. Lawry Buller, Sc.D.; Capt. E. Kilwick Calver, R.N.; A. Carte, M.A., M.D.; W. Chimmo, Commander R.N.; H. Davies, M.D.; Henry Dircks; R. L. J. Ellery, F.R.A.S.; J. Fayrer, M.D.; P. Le Neve Foster M.A.; T. Minchin Goodeve, M.A.; L. D. Brodie Gordon, C.E.; Lt.-Col. J. A. Grant, C.B.; J. Eliot Howard; Rev. A. Hume, LL.D.; Edmund C. Johnson, F.R.C.S.; Lord Lindsay, F.R.A.S.; Clements R. Markham, C.B.; W. Mayes, Staff-Commander R.N.; E. J. Mills, D.Sc.; R. Stirling Newall, F.R.A.S.; G. E. Paget, M.D., D.C.L.; F. Polkinghorne Pascoe, F.L.S.; O. Pemberton, M.R.C.S.; Rev. S. J. Perry; J. A. Phillips, F.G.S.; W. O. Priestley, M.D.; C. B. Radcliffe, M.D.; A. Rattray, M.D., R.N.; E. J. Reed, C.B.; W. Chandler Roberts, F.C.S.; G. W. Royston-Pigott, M.A., M.D.; W. Westcott Rundell; Osbert Salvin, M.A.; Major-General H. Y. Darracott Scott, R.E., C.B.; J. Spiller, F.C.S.; Hon. J. W. Strutt; G. J. Symons, F.M.S.; Sir Henry Thompson, F.R.C.S.; E. T. Truman, M.R.C.S.; F. H. Wenham; Capt. C. W. Wilson, R.N.; H. Woodward, F.G.S.; Lieut.-Col. A. H. P. Stuart Wortley; J. Young, F.C.S.

M. BERTHELOT, the eminent chemist, has been elected a member of the French Academy.

THE reports of the Hunterian Lectures which appear in NATURE are not written by Prof. Flower.

THE Belgian Academy announces the following as subjects for prizes to be awarded in 1874:—1. To perfect in some important point, either in its principles or its applications, the theory of the functions of an imaginary variable. 2. A complete discussion of the temperature of space, based upon experiments, observations, and the calculus, stating the grounds for the choice made between the various temperatures which have been attributed to it. 3. A complete study, theoretic and, if necessary, experimental of the specific absolute heat of simple and compound bodies. 4. New experiments upon uric acid and its derivatives, principally in relation to their chemical structure and their synthesis. 5. (a.) A succinct critical *résumé* of existing observations of the *Mucedineæ*. (b.) The exact determination—applied to only a single species—of the part which is due, first, to the essential nature of the vegetable (its specific energy), and next to the external conditions of its development. (c.) A positive proof, or a satisfactory disproof, of the statement that the fungi of fermentation in certain circumstances, can be transformed into fungi of a higher class. 6. A paper on the Plutonic rocks, or those that are considered such, of Belgium and the French Ardennes, especially in relation to their composition. The prizes for Nos. 1, 4, and 5 will be a gold medal of the value of 600 francs; for No. 6, one of the value of 800 francs; and for No. 3, a medal worth 1,000 francs. The manuscripts, which may be in either French, Flemish, or Latin, must be sent to M. Ad. Quetelet, perpetual secretary, before August 1, 1874.

WE understand that Mr. F. J. M. Page, B.Sc., Assoc. R.S.M., F.C.S., has been appointed chemical assistant to the Brown Institution, under Dr. Burdon Sanderson. It is with much pleasure that we announce this, as it argues well for the attention which will be paid to physiological chemistry, a subject which of late years has received comparatively little attention in England.

AN examination for a Natural Science Scholarship for 60*l.* per annum will be held at Gonville and Caius College, Cambridge, on April 3 and 4. The subjects:—chemistry and experimental physics, zoology with comparative anatomy and physiology, botany with vegetable anatomy and physiology. The Scholarship is tenable for two years, but the tenure may be prolonged for another year if the Scholar sufficiently distinguish